IN THE CLAIMS

This listing of the claims replaces all prior versions, and listings, of the claims in the present application.

Claims 1-7   (Cancelled)

8.   (Currently Amended) A water heater comprising:

a water tank;

a combustion chamber having a thermal relation to the water tank; and

a gas heating element disposed in the combustion chamber, the gas heating element including a first combustive section and a second combustive section separately controlled from the first combustive section;

as set forth in claim 1 wherein the water heater further comprises a valve comprising an inlet to receive gas from a source, a valve spool connected to the inlet, and first and second outlet passageways connected to the combustive sections, respectively, and wherein the valve spool controls at least a portion of the gas to the first outlet passageway and to control at least a portion of the gas to the second outlet passageway.

9.   (Original) A water heater as set forth in claim 8 wherein the water heater further comprises one or more gas manifolds including a first manifold passageway to deliver gas from the first outlet passageway to the first combustive chamber and a second manifold passageway to deliver gas from the second outlet passage way to the second combustive chamber.

10.   (Original) A water heater as set forth in claim 8 wherein the valve comprises a multiport outlet including a first port connected to the first manifold passageway and a second port connected to the second passageway.

11.   (Original) A water heater as set forth in claim 9 wherein the valve spool includes a shaft, wherein the valve further includes a motor connected to the shaft to control movement of the shaft and a controller coupled to the motor to control the motor.

12.   (Original) A water heater as set forth in claim 11 wherein the motor is a linear force motor.

13.   (Currently Amended) A water heater <u>comprising:</u>

   <u>a water tank;</u>

   <u>a combustion chamber having a thermal relation to the water tank; and</u>

   <u>a gas heating element disposed in the combustion chamber, the gas heating element</u>

<u>including a first combustive section and a second combustive section separately controlled from</u>

<u>the first combustive section;</u>

~~as set forth in claim 1~~ and further comprising a single ignition to light the first and second

combustive sections.

Claims 14-17 (Cancelled)

18.   (Original) A storage-type water heater comprising:

   a water tank;

   at least one water temperature sensor operable to sense a water temperature;

   a combustion chamber having a thermal relation to the water tank;

   a gas heating element disposed in the combustion chamber;

   a valve connectable to a gas source and connected to the gas heating element;

and

   a controller in communication with the valve and the temperature sensor, the controller

being operable to receive the sensed temperature, to determine a ratio of the maximum amount

of fuel deliverable to the heating element over a time period based on the sensed temperature,

the ratio being determined from a plurality of available ratios including a ratio between zero and

one hundred percent, and to selectively generate a control signal to control the valve based on

the determination.

19.   (Original) A water heater as set forth in claim 18 wherein a first available ratio is one

hundred percent and a second available ratio is zero percent.

20.   (Original) A water heater as set forth in claim 18 wherein the time period is an

instantaneous time period.

21.   (Original) A water heater as set forth in claim 18 wherein the controller includes a processor and a memory, wherein the memory comprises a heating strategy including at least two conditions, each condition specifying a respective available ratio, and wherein the processor receives the sensed temperature, determines the ratio of the maximum amount of fuel deliverable to the heating element based on the heating strategy and the sensed temperature, and selectively generate the control signal.

22.   (Original) A water heater as set forth in claim 21 wherein a first condition includes a first temperature range and a second condition includes a second temperature range, and wherein the processor determines the ratio by being further operable to determine whether the sensed temperature is within the first temperature range.

23.   (Original) A water heater as set forth in claim 21 wherein a first condition includes a first state of the water heater and wherein a second condition includes a second state of the water heater.

24.   (Original) A water heater as set forth in claim 23 wherein the first state is a draw-down state and the second state is a recovery state.

25.   (Original) A water heater as set forth in claim 21 wherein the at least two conditions include one or more temperature ranges and one or more states.

26.   (Original) A water heater as set forth in claim 25 wherein the one or more temperature ranges is a subset of the one or more states.

27.   (Original) A water heater as set forth in claim 21 wherein the processor determines the ratio based on a plurality of sensed temperature values.

28.   (Original) A water heater as set forth in claim 27 wherein the first condition includes a first state of the water heater, wherein the second condition includes a second state of the water heater, wherein the processor determines the ratio by being further operable to determine a current water heater state based on the plurality of sensed temperature values and determine whether the current water heater state is within the first state.

29.   (Original) A water heater as set forth in claim 27 wherein the first state is a draw-down state and the second state is a recovery state.

30.   (Original) A water heater as set forth in claim 27 wherein the first state includes a first temperature range and the second state includes a second temperature range.

31.   (Original) A water heater as set forth in claim 27 further comprising a second temperature sensor operable to sense a second temperature, wherein the processor is further operable to receive the second sensed temperature, and wherein the processor determines the ratio further based on the second sensed temperature.

32.   (Original) A water heater as set forth in claim 31 wherein the second temperature sensor senses an ambient temperature.

33.   (Original) A water heater as set forth in claim 31 wherein the second temperature sensor senses a second temperature having a relation to a second temperature of the water in the tank.

34.   (Original) A water heater as set forth in claim 21 wherein the memory further includes a usage pattern, wherein the processor is further operable to develop the usage pattern based on the sensed temperature, and wherein the processor determines the ratio further based on the usage pattern.

35.   (Original) A water heater as set forth in claim 21 wherein the memory further includes a water use history, wherein the processor is further operable to develop the water use history based on the sensed temperature, and wherein the controller determines the ratio further based on the water use history.

36.   (Original) A water heater as set forth in claim 18 wherein the heating element comprises a gas burner.

37.   (Original) A water heater as set forth in claim 18 wherein the heating element comprises a combustive section of a multi-section gas-burner.

38.   (Original) A water heater as set forth in claim 18 wherein the control signal controls the valve to deliver fuel in bursts.

39.   (Original) A water heater as set forth in claim 38 wherein each available ratio defines a duty cycle and wherein the controller determines the ratio by being further operable to determine the duty cycle for the bursts based on the water temperature.

40.   (Original) A water heater as set forth in claim 21 wherein the memory further includes a plurality of stored water heating codes, wherein a first water heating code relates to the heating strategy and a second water heating code relates to a second heating strategy, wherein the processor determines the ratio by being further operable to select a water heater code, and obtaining a heating strategy from the memory with the selected water heater code.

41.   (Original) A method of controlling a temperature of water in a storage-type water heater, the storage-type water heater including a tank for storing water, a gas heating element to heat the stored water, a valve connectable to a fuel source and connected to the gas heating element, and a controller adapted to control the valve, the method comprising the acts of:
       sensing a temperature of the water;
       determining a ratio of the maximum amount of fuel deliverable to the heating element over a time period based on a sensed water temperature, the ratio being determined from a plurality of available ratios including a ratio between zero and one hundred percent; and
       controlling the valve to issue an amount of fuel corresponding to the determined ratio.

42.   (Original) A method as set forth in claim 41 wherein a first available ratio is one hundred percent and a second available ratio is zero percent.

43.   (Original) A method as set forth in claim 41 wherein the time period is an instantaneous time period.

44.   (Original) A method as set forth in claim 41 wherein the method further comprises implementing a heating strategy, the heating strategy including at least two conditions, each condition specifying a respective available ratio, and wherein the determining act is further based on the heating strategy.

45.   (Original) A method as set forth in claim 44 wherein the determining act includes determining a condition of the water heater and selecting the ratio based on the determined condition.

46.   (Original) A method as set forth in claim 44 wherein the heating strategy is based on at least one of an element characteristic and a tank characteristic.

47.   (Original) A method as set forth in claim 44 wherein the controller comprises a memory including a table having a plurality of stored water heater codes and respective stored strategies, and wherein the method further comprises the acts of

     providing a water heater code; and

     obtaining the heating strategy from the table with the water heater code.

48.   (Original) A method as set forth in claim 44 wherein a first condition includes a first temperature range and a second condition includes a second temperature range, and wherein the determining act includes determining whether the water temperature is within the first temperature range.

49.   (Original) A method as set forth in claim 44 wherein a first condition includes a first state of the water heater and wherein a second condition includes a second state of the water heater.

50.   (Original) A method as set forth in claim 49 wherein the first state is a draw-down state and the second state is a recovery state.

51.   (Original) A method as set forth in claim 41 wherein the method further comprises sensing a second temperature of the water in the tank, and wherein the determining act is further based on the second temperature.

52.   (Original) A method as set forth in claim 51 wherein the first temperature is sensed by a first sensor and wherein the second temperature is sensed by a second sensor.

53.   (Original) A method as set forth in claim 51 wherein the second temperature is sensed after the first temperature.

54.   (Original) A method as set forth in claim 53 wherein the method further comprises calculating a slope of a line based on the first and second temperatures, wherein the calculated slope signifies a water heater state, and wherein the determining act is further based on the water heater state.

55.   (Original) A method as set forth in claim 53 wherein the method further comprises comparing the first and second temperatures, wherein the comparison signifies a water heater state, and wherein the determining act is further based on the water heater state.

56.   (Original) A method as set forth in claim 44 wherein the at least two conditions include one or more temperature ranges and one or more states.

57.   (Original) A method as set forth in claim 56 wherein the one or more temperature ranges is a subset of the one or more states.

58.   (Original) A method as set forth in claim 41 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a usage pattern; and
wherein the determining act is further based on the usage pattern.

59.   (Original) A method as set forth in claim 41 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a water use history; and
wherein the determining a ratio act is further based on the water use history.

60.   (Original) A method as set forth in claim 41 wherein the controlling act includes controlling the valve to deliver fuel in bursts.

61.   (Original) A method as set forth in claim 60 wherein each available ratio defines a duty cycle for the bursts and wherein the determining act includes determining the duty cycle for the bursts.

62.   (Original) A method as set forth in claim 41 wherein the method further comprises sensing an ambient temperature and wherein the determining act is further based on the ambient temperature.

Claims 63-102   (Cancelled)

103.   (Original) A method of controlling a temperature of water in a storage-type water heater, the storage-type water heater including a tank for storing water and a water temperature sensor, the method comprising the acts of:

storing water in the water tank so that the water can be heated to a selected temperature during periods of non-use;

sensing a temperature of the water;

determining a ratio of the maximum amount of power deliverable by the heating element over a time period based on a sensed water temperature, the ratio being determined from a plurality of available ratios including a ratio between zero and one hundred percent; and

delivering power with the heating element based on the determined ratio.

Claim 104   (Cancelled)

105.   (Original) A method as set forth in claim 103 wherein the power includes thermal power and the heating element comprises a gas heating element.

106.   (Original) A method as set forth in claim 105 wherein the gas heating element comprises a gas burner.

107.   (Original) A method as set forth in claim 105 wherein the heating element comprises a combustive section of a multi-section gas burner.

108.   (Original) A method as set forth in claim 103 wherein the method further comprises implementing a heating strategy, the heating strategy including at least two conditions, each condition specifying a respective available ratio, and wherein the determining act is further based on the heating strategy.

109.   (Original) A method as set forth in claim 108 wherein the determining act includes determining a condition of the water heater and selecting the ratio based on the determined condition.

110.   (Original) A method as set forth in claim 103 wherein the method further comprises sensing a second temperature of the water in the tank, and wherein the determining act is further based on the second temperature.

111.   (Original) A method as set forth in claim 103 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a usage pattern; and
wherein the determining act is further based on the usage pattern.

112.   (Original) A method as set forth in claim 103 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a water use history; and
wherein the determining act is further based on the water use history.

113.   (Original) A method as set forth in claim 103 wherein each available ratio defines a duty cycle, and wherein the delivering act includes repeatedly bursting an amount of power, each burst followed by a period during which power is not delivered, thereby resulting in the duty cycle.

114.   (Original) A method as set forth in claim 103 wherein the time period is an instantaneous time period.

115.   (Original) A method of controlling a temperature of water in a storage-type water heater, the storage-type water heater including a tank for storing water and a water temperature sensor, the method comprising the acts of:

storing water in the water tank so that the water can be heated to a selected temperature during periods of non-use;

sensing a temperature of the water;

determining a ratio of the maximum amount of energy deliverable to the heating element over a time period based on a sensed water temperature, the ratio being determined from a plurality of available ratios including a ratio between zero and one hundred percent; and

delivering energy to the heating element based on the determined ratio.

116.   (Original) A method as set forth in claim 115 wherein the energy includes electrical energy and the heating element comprises an electrical heating element.

117.   (Original) A method as set forth in claim 115 wherein the energy includes thermal energy and the heating element comprises a gas heating element.

118.   (Original) A method as set forth in claim 117 wherein the energy is a fuel.

119.   (Original) A method as set forth in claim 117 wherein the gas heating element comprises a gas burner.

120.   (Original) A method as set forth in claim 117 wherein the heating element comprises a combustive section of a multi-section gas burner.

121.   (Original) A method as set forth in claim 115 wherein the method further comprises implementing a heating strategy, the heating strategy including at least two conditions, each condition specifying a respective available ratio, and wherein the determining act is further based on the heating strategy.

122.   (Original) A method as set forth in claim 121 wherein the determining act includes determining a condition of the water heater and selecting the ratio based on the determined condition.

123.   (Original) A method as set forth in claim 115 wherein the method further comprises sensing a second temperature of the water in the tank, and wherein the determining act is further based on the second temperature.

124.   (Original) A method as set forth in claim 115 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a usage pattern; and
wherein the determining act is further based on the usage pattern.

125.   (Original) A method as set forth in claim 115 and further comprising:
repeating the act of sensing a temperature of the water;
storing multiple sensed temperatures, the storing act resulting in a water use history; and
wherein the determining act is further based on the water use history.

126.   (Original) A method as set forth in claim 115 wherein each available ratio defines a duty cycle, and wherein the delivering act includes repeatedly bursting an amount of energy, each burst followed by a period during which energy is not delivered, thereby resulting in the duty cycle.

127.   (Original) A method as set forth in claim 115 wherein the time period is an instantaneous time period.